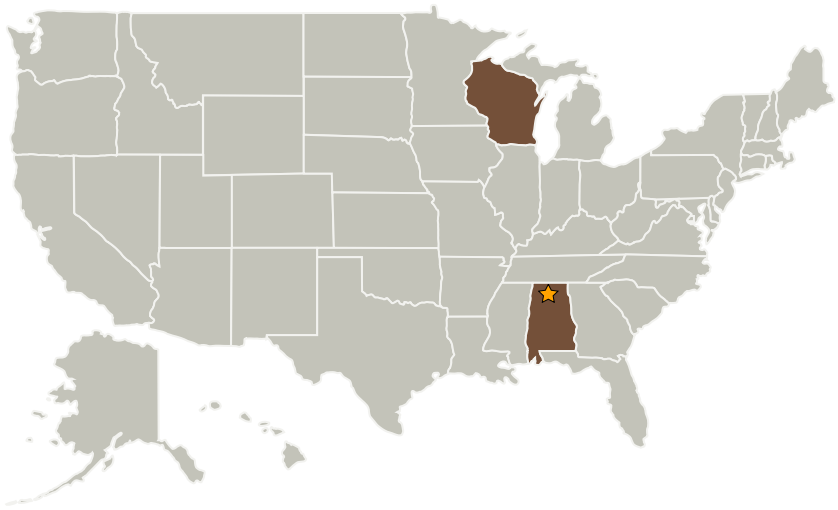
Advanced Vortex Hybrid Rocket Engine (AVHRE), Phase I

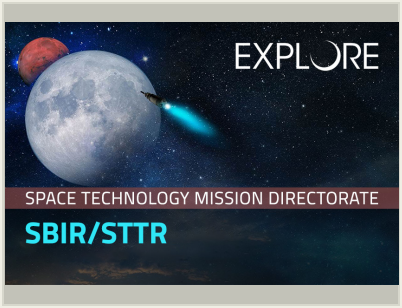
Completed Technology Project (2005 - 2005)

Project Introduction

Orbital Technologies Corporation (ORBITEC) proposes to develop a unique Advanced Vortex Hybrid Rocket Engine (AVHRE) to achieve a highly-reliable, low-cost and extremely versatile propulsion technology. The benefits of AVHRE result from the combination of ORBITEC's patented vortex injection technique; high-regression rate, paraffin solid fuels; and a new fuel formulation innovation to control the solid fuel regression characteristics and provide improved structural integrity of the grain. A vortex injector generates a coaxial vortex pair, driving high solid-fuel regression rates and improved combustion efficiency. In addition, paraffin also regresses very rapidly, further enhancing the systems flexibility. The rapid regression rates and many design degrees of freedom offered by AVHRE offers the potential for: (1) increased propellant mass fractions; (2) the ability to tailor and optimize a hybrid propulsion system for a specific application; (3) increased ISP efficiency; (4) a reduction or elimination of residual fuel; (5) improved grain structural integrity and increased melting temperature; (6) reduced need for thermal insulation. Phase I will demonstrate the feasibility and merit of AVHRE through design, analysis, laboratory testing, and hot firings of up to 1,000 lbf thrust.

Primary U.S. Work Locations and Key Partners





Advanced Vortex Hybrid Rocket Engine (AVHRE), Phase I

Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Advanced Vortex Hybrid Rocket Engine (AVHRE), Phase I

Completed Technology Project (2005 - 2005)

Organizations Performing Work	Role	Type	Location
★Marshall Space Flight Center(MSFC)	Lead Organization	NASA Center	Huntsville, Alabama
Orbital Technologies Corporation	Supporting Organization	Industry Women-Owned Small Business (WOSB)	Madison, Wisconsin

Primary U.S. Work Locations	
Alabama	Wisconsin

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Ronald Teeter

Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.1 Chemical Space Propulsion
    - TX01.1.5 Hybrids